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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/521,903	Applicant(s) TOUR ET AL.	
	Examiner Serena L. Hanor	Art Unit 4116	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 26-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☒ Claim(s) 8-25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>01/14/2005, 09/11/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election acknowledged

Telephone Election

During a telephone conversation with Mr. Victor Behar on 10/16/2007 and 11/01/2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-25. Affirmation of this election must be made by applicant in replying to this Office action. Claims 26-44 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Restriction

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-25, drawn to a method for functionalizing carbon nanotubes in the absence of a solvent.

Group II, claim(s) 26-44, drawn to a method for functionalizing carbon nanotubes using a dry mixing process.

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: a method for functionalizing carbon nanotubes does not constitute a special technical feature that is

novel to the art, and the two methods, one in the absence of a solvent and the other using a dry mixing process, do not share a common process step that could be considered a special technical feature.

3. Unity exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding claimed technical features. The express “special technical features” is defined as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art.”(Rule 13.2).

Lack of unity of invention may be directly evident “a priori,” that is, before considering the claims in relation to any prior art, or may only become apparent “a posteriori,” that is, after taking the prior art into consideration. For example, independent claims to A + X, A + Y, and X + Y can be said to lack unity a priori as there is no subject matter common to all claims. In the instant case, independent claims are directed to a method for functionalizing carbon nanotubes in the absence of a solvent and a method for functionalizing carbon nanotubes using a dry mixing process where no common subject matter is found.

Therefore, the prior art of the record supports restriction in to the groups as mentioned immediately above.

Joint Inventors

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim

Art Unit: 4116

remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-2, 4-6, 11, 14-20 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3-7, 14-16, 18-19, and 29 of U.S. Patent No. 7,250,147 B2 (hereafter, US'147). Although the conflicting claims are not identical, they are not patentably distinct from each other because US'147 is drawn to a method comprising selecting a plurality of carbon nanotubes, which are single-wall with an average diameter of at most 0.7 nm, and reacting/mixing it with an diazonium specie to form derivatized carbon nanotubes, wherein the diazonium specie is formed in situ (Instant Claims 1-2, 4-6, 11, and 14 are

Art Unit: 4116

obvious over Claims 1, 3-4, 6-7, 16, and 29 of US'147). The precursor of the diazonium specie is an aniline derivative, which is generated with a nitrite (Instant Claims 19-20 are obvious over Claim 5 of US'147). The diazonium specie comprises an aryl diazonium specie, an alkyl diazonium specie, an alkenyl diazonium specie, an alkynyl diazonium specie, and a diazonium salt, which comprises an aryl diazonium salt, an alkyl diazonium salt, an alkenyl diazonium salt, and an alkynyl diazonium salt (Instant Claims 15-18 are obvious over Claims 14-15 and 18-19 of US'147).

7. Claims 1-2, 4-5, and 14 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 97-98 of U.S. Patent No. 7,304,103 (hereafter, US'103). Although the conflicting claims are not identical, they are not patentably distinct from each other because US'103 is drawn to a method for making a polymer material comprising derivatizing carbon nanotubes, which can be single-wall, with functional moieties to form derivatized carbon nanotubes, wherein the functional moieties are derivatized to the carbon nanotubes utilizing a diazonium specie.

8. Claims 1, 4-5, and 14 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 69-71 and 132 of copending Application No. 10/632,948. Although the conflicting claims are not identical, they are not patentably distinct from each other because copending Application No. 10/632,948 is drawn to a process comprising derivatizing a carbon nanotube, which can be single-wall, with a diazonium specie.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Art Unit: 4116

9. Claims 1-5, 11-20, and 25 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 4-5, 7-10, 15-16, 20, 24 and 28 of copending Application No. 10/593,918. Although the conflicting claims are not identical, they are not patentably distinct from each other because copending Application No. 10/593,918 is drawn to a method comprising functionalizing dispersed carbon nanotubes by covalently attaching functional groups (Instant Claims 1 and 11-13 are obvious over co-pending Claims 1, 16, and 24). The carbon nanotubes are selected from the group consisting of single-wall, double-wall, multi-wall, and small diameter, and the functionalizing involves a functionalizing agent selected from the group consisting of carbocations, halonium ions, metal cations, carbon radicals, halogen radicals, hetero-atom radical species, metal-based radicals, dipolarophiles, and a diazonium species, which is generated in situ by reaction of an aniline species with a nitrite species in the presence of an acid to produce a diazonium salt (Instant Claims 2, 4-5, 14-20, and 25 are obvious over co-pending Claims 2, 4-5, 7-10, and 20). The functionalized carbon nanotubes have at least about 1 functional group per every 100 carbon nanotube carbons (Instant Claim 3 is obvious over copending Claims 15 and 28).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. Claims 1-2, 4-5, 11, and 14 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 3-5 of copending Application No. 10/561,712. Although the conflicting claims are

Art Unit: 4116

not identical, they are not patentably distinct from each other because copending Application No. 10/561,712 is drawn to a method comprising functionalizing CNTs (carbon nanotubes), which can be single-wall, by reacting them with at least one diazonium species in a solvent-free process to form functionalized CNTs.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

11. Claims 1-2, 4-5, and 14 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 7-9, and 18-19 of copending Application No. 11/762,522. Although the conflicting claims are not identical, they are not patentably distinct from each other because copending Application No. 11/762,522 is drawn to a method for derivatizing carbon nanotubes comprising selecting a plurality of carbon nanotubes, which can comprise single-wall and multi-wall, and reacting the plurality of carbon nanotubes with a diazonium specie.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Objections

12. Claims 8-25 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims not been further treated on the merits.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeffrey L. Bahr et al (Functionalization of Carbon Nanotubes by Electrochemical Reduction of Aryl Diazonium Salts: A Bucky Paper Electrode).

Jeffrey L. Bahr et al. is drawn to the functionalization of carbon nanotubes by electrochemical reduction of aryl diazonium salts (Title). The derivatization of small-diameter (about 0.7 nm) single-wall carbon nanotubes with an aryl diazonium salt results in a degree of functionalization of about one out of every 20 carbons in the nanotubes bearing a functionalized moiety (Abstract). A bucky paper is immersed in an acetonitrile solution of the diazonium salt and tetra-*n*-butylammonium tetrafluoroborate (p. 6542, col. 1).

16. Claims 1-7 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by K. Tanaka et al.

K. Tanaka et al. is drawn to solvent-free organic synthesis. For example, the addition and coupling reaction of [60]fullerene proceeds efficiently in the solid state (p. 1041, col. 2). It is well known in the art that a fullerene has a diameter with the range of 0.7-2.0 nm. A mixture of [60]fullerene, ethyl bromoacetate, zinc dust, and a stainless steel ball was vigorously agitated for 20 min at room temperature (p. 1041, col. 2).

Art Unit: 4116

17. Claims 1-2, 4-7 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by US 6,187,823 (hereafter, US'823).

US'823 is drawn to the method of solubilizing single-wall carbon nanotubes. Shortened SWNTs have an estimated diameter of 1.38 nm (col. 5, lines 59-64). The carboxylic acid groups on the open ends of the shortened SWNTs are reacted with an amine or an alkylaryl amine without a solvent (col. 6, lines 26-36). The mixture is heated to 50-200°C, or more preferably 90-100°C (col. 6, lines 46-47).

Conclusion

18. Claims 1-7 have been rejected.

19. Claims 8-25 have not been examined on the merits due to improper multiple dependencies.

20. Claims 26-44 are drawn to a non-elected invention.

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. T. Tanaka et al, Maggini et al.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SERENA L. HANOR whose telephone number is (571)270-3593. The examiner can normally be reached on Monday - Thursday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 4116

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SLH

/Vickie Kim/
Supervisory Patent Examiner, Art Unit 4116